

DEQ Drought Indicator Web Site

Providing Tools For
Drought Planning and
Response in Virginia

Goals of Drought Planning Web

Increase certainty of meeting critical uses during times of drought

➤ Provide Data:

- Hydrologic/Meteorological data for drought **indicators**
- **Integrate** multiple sources of data into a single web site
 - ◆ Multiple indicators may form better triggers, especially early
- Gather and distribute the most **localized** data available
- Present data to show temporal and spatial **patterns**

➤ Analyze Data:

- Provide **historical** context (how wet/dry)
- Provide **future** projection
- Determine general **category** (warning, watch, emergency)

➤ Facilitate:

- Drought **Planning**
- Drought **Response**

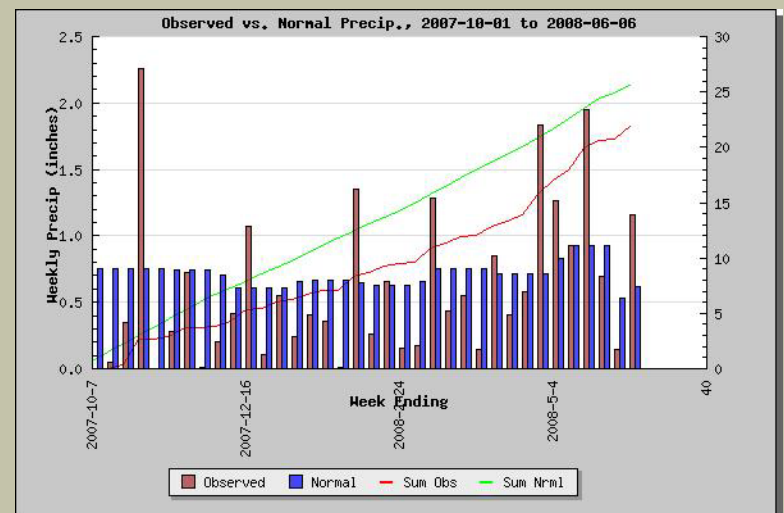
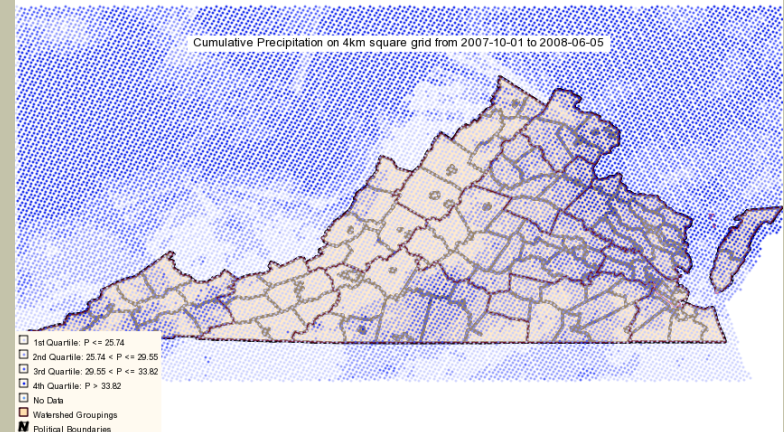


Drought Web: Data

- **Rainfall**
 - NOAA 4km x 4km grid – daily
 - Historical Means from 1971-2000, daily/monthly totals since 2005
- **Stream Flow**
 - USGS/DEQ Gaging Network reporting flow rate/gage height
 - Historical daily flow (period of record varies)
- **Groundwater**
 - USGS/DEQ Gaging Network
- **Palmer Drought Severity Index**
 - Reported by NOAA, regional level (coarse)
- **National Drought Regions**
- **Locally derived metrics**
 - These data can be used as inputs for locally derived models or analysis techniques
 - Ex: North Fork Shenandoah MIF Study

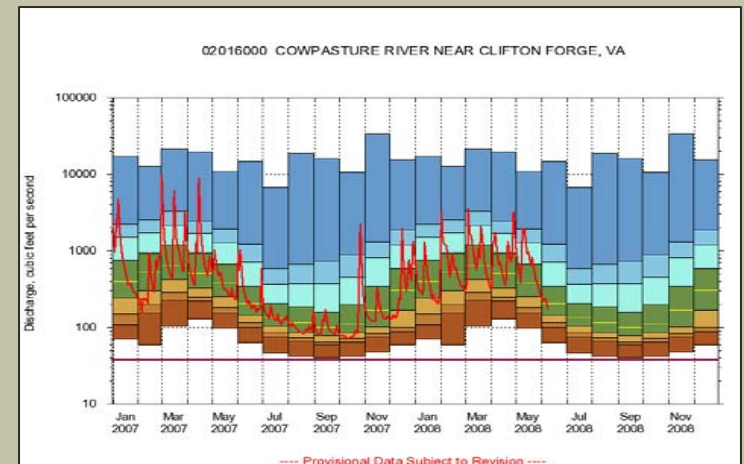
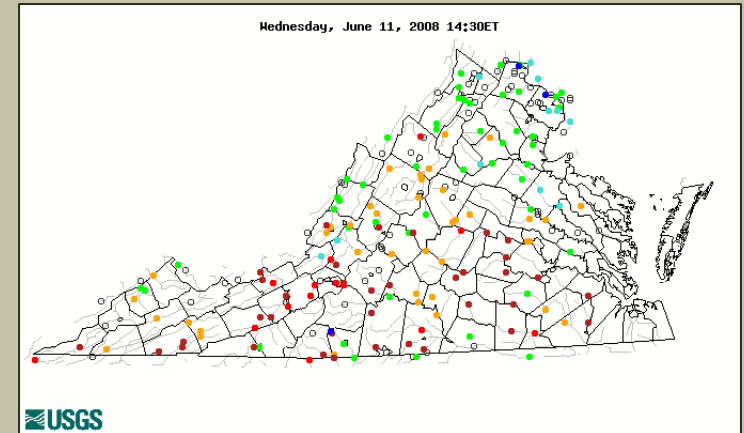
Drought Web: Rainfall Data

- "Early Warning Indicator"
- Lack of Rainfall = "Meteorological Drought"
 - Prolonged meteorological drought leads to hydrologic drought
- Fall/Winter:
 - Groundwater Recharge / Base flow
- Spring/Summer:
 - Predictor of Irrigation/Lawn demand
- All Seasons:
 - Storm Flow / Reservoir Refill



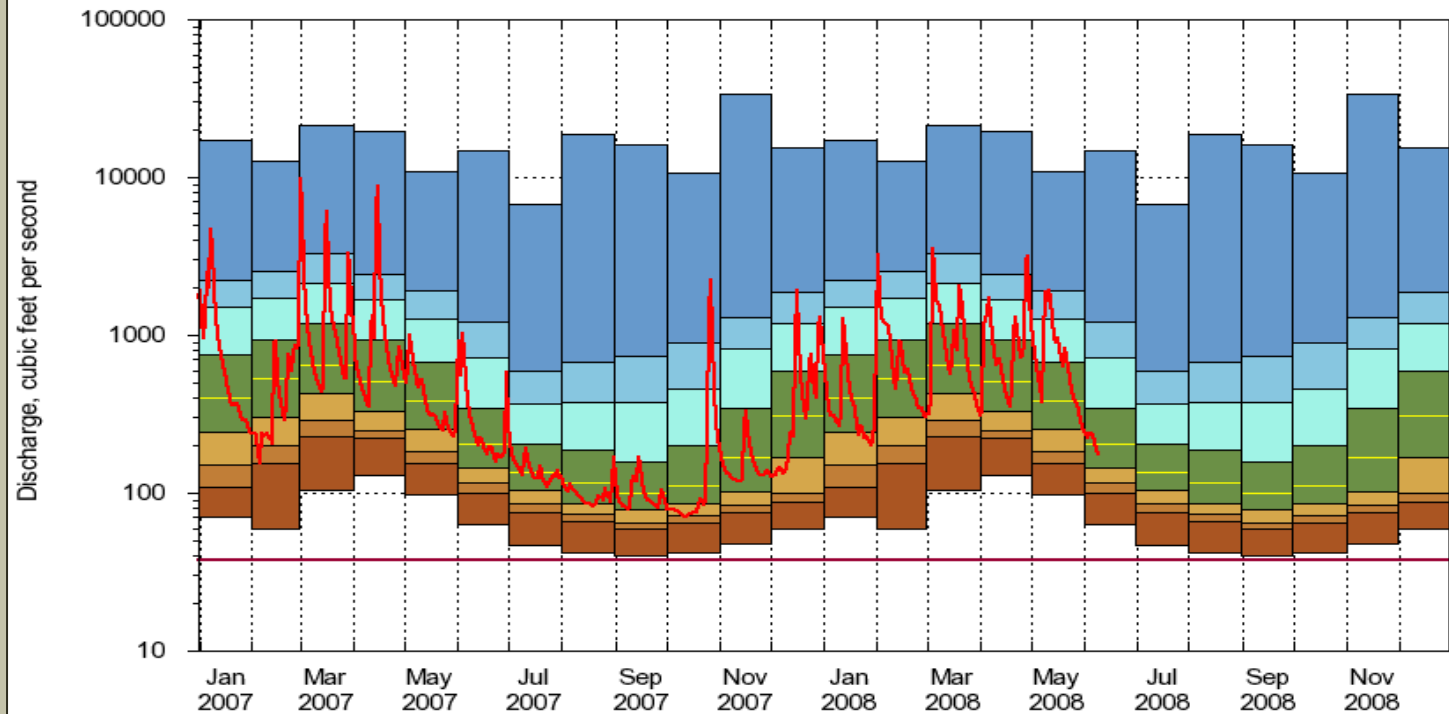
Drought Web: Flow Data

- Balance between precip. and ground water (base flow)
- 198 Real time Flow gages currently
- 395 Gages with historical, daily records
- ✓ USGS Trend analysis (1st in a series of deliverables from USGS) can show likely future flow levels



Drought Site: Flow Duration

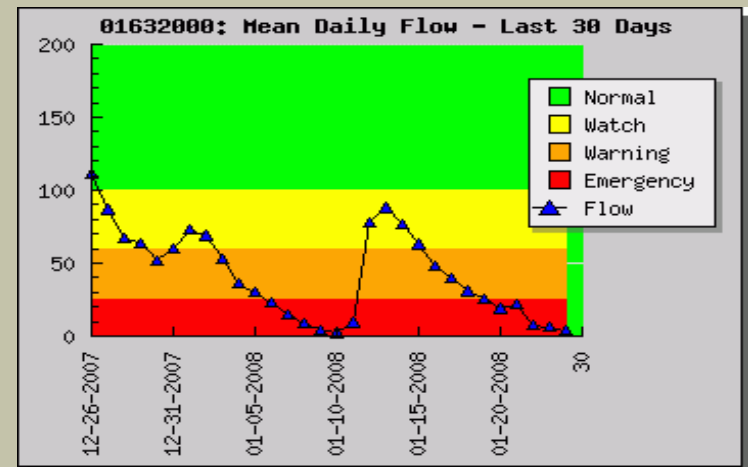
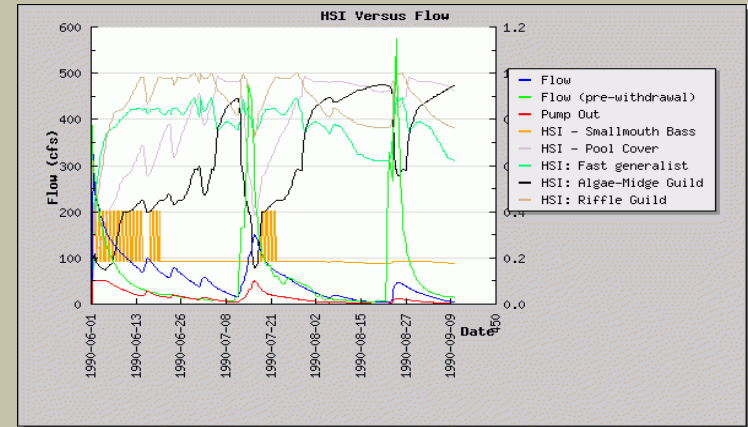
02016000 COWPASTURE RIVER NEAR CLIFTON FORGE, VA



---- Provisional Data Subject to Revision ----

Drought Web: Local Metrics

- NF Shenandoah
 - Large recreation component of local economy
 - Estimated that freshwater anglers generate \$16.2 to \$21.4 million/year
- Flow studied in 2000-2002 by VT/USGS
 - Flow needs of aquatic life, algae blooms
 - Recommended flow levels based on loss of habitat/potential for harmful WQ effects



Drought Web: Format/Analysis

- Time Series Graphs
- Percent of Historical Mean
 - Color-coded indicators reflecting thresholds used by state drought task force
- Spatial Distribution
 - Data superimposed on maps
- Localized Watersheds
 - Limited only by presence of gage(s)
 - 4 km x 4 km rainfall grid
 - Custom regions can be created if supplied geographic boundaries (GIS File), desired gages

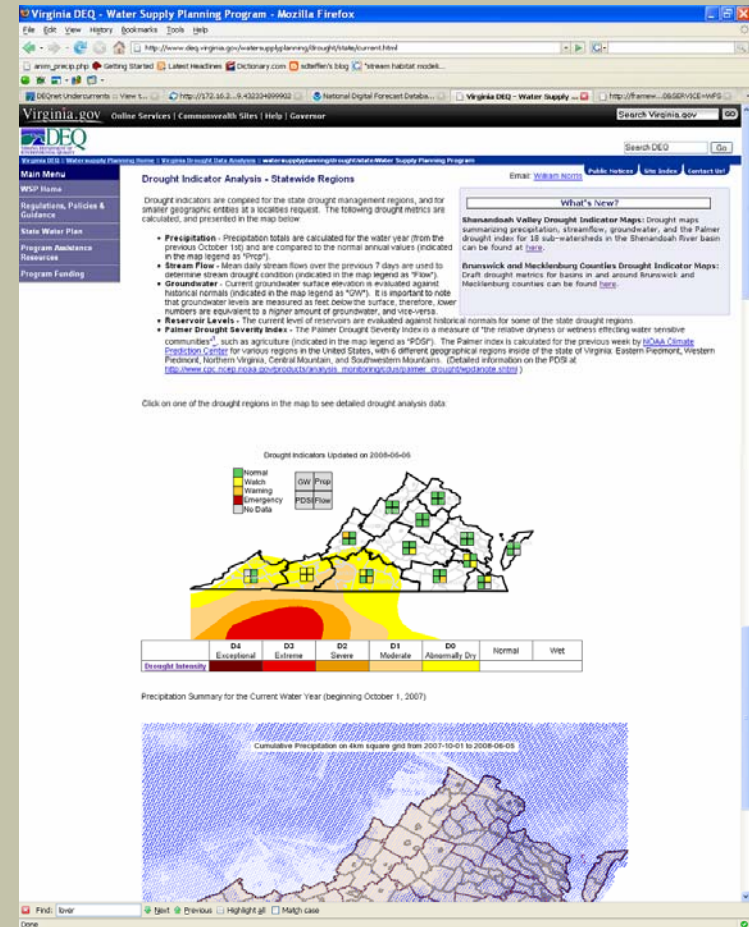
Drought Web: Site Tour

Site Hosted at:

<http://www.deq.virginia.gov/watersupplyplanning/drought/>

Currently 3 Different Regional Views:

- State Drought Regions
- Shenandoah Valley Regions
- Mecklenburg and Brunswick Counties





Drought Web: Planning/Response

- **Provide Data in “near real-time”**
 - Site updated every day at 6 AM
 - USGS data is usually ~1 day old
 - NOAA data is valid since 8 AM on the previous day
- **Provide Future Cast Data:**
 - Rain Forecast
 - Stream flow forecast (selected stations)

Drought Web: Planning/Response, continued

- **Maps of monitoring sites show:**
 - Where the data is strongest
 - Where data gaps exist
 - Thresholds can be determined with this (un)certainty in mind
- **Targeting Communications/Enforcement**
 - VT report on 2002 drought showed that communication was the single most important piece of conservation measures
 - Where is it wet/dry?
 - What sub-basins need the most “message”

Drought Web: Future Tools

- **Plots of Interacting Metrics**
 - Ex: Flow and GW superimposed
- **Modeling Water Use Restrictions**
 - Enter the reductions and trigger points, and simulation will evaluate response during drought of record (or other, user selectable period)
- **More Extensive Integration of Forecasts**
 - Modeling flow response to forecasted precipitation
 - Probabilities of drought conditions/shortages